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SCARLET FEVER,

- BY -

HARRY O. HALL,

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## THE ETIOLOGY OF SCARLET FEVER.

By HARRY O. HALL,

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In a paper upon the above subject published in the MEDICAL RECORD of September 2d, the author, Dr. W. J. Class, refers to a report by Behla, which appeared in the *Centralblatt für Bakteriologie*, in which the writer speaks of a scarlet rash developing "in some pigs belonging to a peasant in whose family there were several typical cases of scarlatina. In order to see whether there was any connection between the scarlet fever in the peasant's family and the rash in the pigs, Behla took some blood from one of the children having scarlet fever and inoculated a healthy pig with it; after a few days a scarlet rash appeared around the edges of the inoculation wound, followed by desquamation."

Upon reading this quotation from Behla's paper, the question arose in my mind whether the scarlet rash which developed in the pigs was communicated to them from the infected children, or was not the disease more likely to have been communicated alike to the children and to the pigs through the medium of milk fed to them from diseased cows? It is a well-known fact that at various agricultural experiment stations milk from tuberculous cattle fed to hogs has produced tuberculosis in the hogs as revealed by post-mortem examination.

The etiology of scarlet fever is a subject which has long engaged the thought of the best minds in the medical profession, and I feel sure that anything which may throw light upon the vexed question or lead to a new line of investigation will be welcomed by medical men, even though it may come from a layman.

In the course of about twenty-five years' service in the library of the Surgeon-General's office, in connection with the compilation of the "Index Catalogue," and as custodian of the largest collection of medical journals in the world, many things have come to my observation which have started a train of thought that if followed up might have proved of value to medical science. One of the subjects which particularly attracted my attention was that of "milk as a cause of disease," and I was led to make a somewhat extensive research into the literature of the subject, which resulted in revealing some very interesting if not startling facts. I learned, for example:

I. That, while scarlet fever occurs in epidemic form in all countries where cow's milk forms a staple article of food, especially among children, it does not occur in countries where cow's milk is not used as a food or where children are raised on mother's milk only.

II. That in Japan and China, where cow's milk is not used as a food, scarlet fever is unknown or very rare. (In a list of three hundred and ten different countries, cities, and towns in which epidemics of scarlet fever have occurred, Japan, China, and Corea do not appear.)

III. That in India, where cow's milk is used as a food, but where, as in Japan, children are nursed until three, four, and even six years of age, scarlet fever is rare, if not unknown.

IV. That in countries where goat's milk and ass's milk are used as a food scarlet fever is unknown.

V. That epidemics of scarlet fever in London and elsewhere have been traced directly to the use of milk from certain cows affected with the teat-and-udder disease, and that milk had not been infected by coming in contact with the disease in man.

VI. That certain diseases in the lower animals are coexistent with or precede or follow similar epidemics in the human race.

The research which brought out the above interesting facts was made several years ago after reading an account of an extensive epidemic of scarlet fever in London which was said to have been traced to milk from a certain dairy farm. Shortly after reading the account above mentioned, I came across a paper written by Dr. A. S. Ashmead, of New York, published in the *Journal of the American Medical Association*, on "The Beneficial Consequences of the Absence of Cow's Milk in Japan." This led me to wonder if in Japan scarlet fever was as prevalent as in countries where cow's milk is used as a food, and the result of my investigation showed the almost entire absence of scarlet fever from that country. So far as I have been able to ascertain, no one has heretofore connected the exemption from scarlet fever with the non-use of milk as a food. This is the point which I desire to emphasize and bring to the attention of the medical profession, especially those who are investigating the etiology of scarlet fever. To bring into apposition the several facts mentioned above I quote the following:

In December, 1885, an extensive epidemic of scarlet fever broke out in London. Upon investigation it was found that in every case the milk used by the patient came from a certain dairy farm. On further investigation it was found that certain cows in a certain shed from which the milk was supplied to the infected parties were suffering from a peculiar vesicular disease of the teats and udders. Upon the discontinuance of the sale of milk from this shed no new cases developed among the consumers; but, strange to say, upon its becoming known among the poor farmers in the neighborhood of the dairy that the milk was being thrown away, numbers of them surreptitiously obtained the milk from the cow-men, and within a short time an epidemic of scarlet fever broke out in the neighborhood, and many cases occurred. Subsequently another epidemic broke out in London among the consumers of milk from cows in a different shed of the same dairy. On investigation it was found that some new milch cows which had been kept in the quarantine shed the requisite time had on a certain date been admitted to this second shed of fifty cows. From the date of their admission the second epidemic occurred. Again the cows were submitted to examination, and certain ones were found to have discharging vesicles upon the teats and udders. Persons using milk from cows in still another shed were exempt un-

til a certain date, when an outbreak of fever occurring among the consumers, it was found on examination that two cows in that shed were affected with the teat-and-udder disease in its early stage. Pus was taken from these vesicles and injected under the skin of healthy calves, and within a few days similar vesicles



appeared upon the udders and teats of the calves, accompanied with high fever, sore throat, diarrhoea, running at the nose, and, in fact, all the symptoms of true scarlet fever.

Dr. Cameron, one of the physicians who investigated this strange epidemic, expressed his belief that the disease found to exist in the cows "was a specific disease capable of being communicated to healthy cows by direct inoculation of the teats and udders with virus conveyed by the milker from a diseased animal."

**Absence of Cow's Milk from Japan.**—In regard to the absence of cow's milk from Japan and its beneficial consequences Dr. A. S. Ashmead says:

"One of the most striking features of that most curious of countries, Japan, is the singular scarcity of domestic animals. Horses and cows are only seen in cities and on the roads as pack animals. The cow, in Japan, is not wanted for her milk. Being an animal product, milk falls under the general condemnation which excludes everything that has pertained to a living body from the alimentation of man. . . . Thus it happens that as Japan may not use cow's milk, the Japanese mothers are compelled by stress of circumstances to suckle their babes themselves. Artificial lactation is altogether unknown. The children are suckled until their sixth year. The great reward which Japan reaps from this meritorious care of motherhood is the absence of rachitism. All observers have referred to the fact, and to the absence of rachitic pelvises. I think I am not wrong in affirming that the chief and central source of these great sanitary blessings is the absence of cow's milk."

**Absence of Scarlet Fever from Japan.**—Dr. Stuart Eldridge, one of the surgeons of the General Hospital of Yokohama, and secretary of the board of health of that city, in a paper published in the Medical Reports Imperial Customs of China, in 1878, says in regard to scarlet fever: "If this disease ever existed in Japan it has as yet made no appearance among foreign residents in anything approaching an epidemic form. Two cases are reported under the heading of scarlet fever as having been admitted to hospital in the years 1868 and 1870. No death from this cause is noted in the mortuary reports. The experience of the local practitioners includes but two other cases which were suspected to be scarlet fever, both occurring in the practice of the same physician, neither fatal, and both considered by the reporter as not beyond a doubt as to their character. I cannot learn that scarlatina has been met with among the natives by any prominent practitioner of medicine, either native or foreign. It is apparently but seldom met with in China. The cases above mentioned may have been scarlet fever, but it is by no means impossible that they may have been cases of any one of several other diseases known to occur here. The first case was that of an American sailor, recently arrived. Granting that this was one of scarlet fever, it is not unlikely, in view of the portability and persistency of scarlatinal contagion, that the infection was brought from home in the man's shore clothing, and that he himself fell the first and only victim. Of the second case mentioned in the hospital books, that of one of the few natives admitted for disease, the stay in hospital was so short as to

prove that the disease, whatever it was, was mild, while it is very improbable that of the few cases of natives admitted to the hospital one should be that of the only known occurrence of a generally epidemic disease."

To show that Dr. Eldridge had no suspicion that the absence of cow's milk from Japan has any connection with the immunity of the Japanese from scarlatina I quote further from the same report:

"But that we have so far escaped the ravages of scarlet fever affords no certain assurance of immunity in the future. A disease of the nature of that in question, dependent upon a persistent, portable, and intense contagion, is almost certain to reach us sooner or later, while the rapid increase in the number of children in proportion to the adults of the foreign community is yearly rendering the circumstances more favorable for its propagation when once imported.

"If the theory of Dr. Carpenter is correct, and decomposing blood furnishes the origin or nidus of scarlatinal infection, the comparative rarity of collection of this form of garbage in China and Japan may be connected with the non-occurrence of this fever; or it may be possible that the existing influences of soil or climate are unfavorable to the development or propagation of the specific poison. But the relations of such conditions to the disease in question, if they exist, are so little understood that it will be the part of wisdom to treat any suspicious case with exceptional precautions against the propagation of the malady."

**Scarlet Fever Rare in India.**—Surgeon-Major Murray, of Bengal, in an article in *The Lancet* for October 27, 1888, in discussing a case of sporadic scarlet fever originating *de novo* in India, says:

"Cases of scarlet fever are so extremely rare in India that the publication of the following case may be of interest. Chevers, in his last work (a commentary on the diseases of India), writes: 'I never saw any form of scarlatina in lower Bengal, or any disease which could be mistaken for it; neither has any medical man with whom I have discussed the subject met with a genuine and unmistakable case in that great province.'

"Writing in 1864, Dr. Peet, who had great experience in the Bombay Presidency, said: 'Scarlet fever is altogether unknown in Western India.' Deputy Surgeon-General G. Mackay, an officer of large experience, who spent all his term of service in the Madras Presidency, and was for several years civil surgeon of Ootacamund, never saw a case of the disease in India. A few cases have been reported as having occurred at military stations in the families of soldiers recently arrived from England—imported cases."

To what extent milk is used in India as a food I am not able to say, but it is not customary to feed it to infants or young children. In an article running through two volumes of the *Indian Medical Gazette*, on the infantile diseases of India, Dr. T. R. Hogg, the writer, says: "As families subsist on four rupees a month, the mother feeds on dal, chupatties, rice, rarely varied by the luxuries of sheep's head or goat's flesh. The child is kept at the breast without any other nourishment as long as possible; the period of lactation is prolonged three years or more, and so long as an in-



fant thrives and gains weight on suitable breast milk only he is preserved from sickness or the dangers of dentition, and is less prone to contract worms or infectious fevers."

Even if it should be found that in countries where cow's milk is commonly used as food scarlet fever is rare or unknown, it would be interesting to know more about the cattle of the country, the character of their food, and the nature of their diseases, etc., before we arrive at any conclusions.

One fact is beyond any dispute; that is, that many diseases, and particularly tuberculosis and scarlet fever, have been traced directly to milk consumed. The questions to be decided is, Can these diseases, or do they, originate in the cows?

Writing on the subject of "the diseases of the cow by which infection is conveyed to the consumer of her milk," Dr. H. E. Armstrong says: "It has been clearly demonstrated that milk may of itself be diseased as the product of a diseased animal. Foot-and-mouth disease, as is well known, is transmissible from quadruped to man. So is tuberculosis. During recent years several outbreaks of human scarlet fever and diphtheria have been undoubtedly due to milk supply.

"In some dairy farms cows have been found to be ill, their most noteworthy symptoms being febrile disturbances, vesicular eruptions on the udder, scabbed teats, and a loss of hair in patches. The investigators report that these symptoms indicate a disease or diseases in the cow which are communicable, as scarlet fever or diphtheria, respectively, to the consumers of the milk."

In an epidemic of scarlatina occurring at Wimbledon, it was found that out of five hundred and forty-five cases of the disease four hundred and ninety-three occurred among a population of about fifteen hundred persons using milk from a certain suspected dairy, while but fifty-two cases out of a population of fifteen thousand persons using milk from other dairies occurred.

In another outbreak of scarlet fever three children in one family who were fed on a particular cow's milk caught the disease, and one died. The only other child in the family, supplied with milk from a different dairy, escaped entirely.

Very few persons whose attention has not been drawn specially to it have any conception of the enormous quantity of milk consumed in our large cities. When we look at the figures and compare them with the high death rate of children and infants, the importance of throwing every safeguard about this almost necessary article of food will be apparent. Averaging the daily consumption of milk per capita at two-thirds of a pint, the amount consumed in New York is one hundred and eighty million quarts at a cost of \$13,500,000; in Philadelphia, seventy-five million quarts. In a total city population of a few principal cities of five million there are annually consumed over four hundred million quarts of milk, costing the consumers \$32,000,000.

**Connection between the Diseases of Animals and Man.**—While it is true that the idea that cow's milk may become the vehicle of communicating disease to

man is of recent origin, it has long been known that many of the diseases of animals bear a great similarity to certain diseases in man, and that many of the diseases with which we are now afflicted were originally peculiar to the lower animals. It has also been observed that epidemics of certain diseases in the lower animals are coexistent with or precede or follow similar epidemics of disease in the human species.

A reference to George Fleming's work on animal plagues from B.C. 1490 to A.D. 1800 reveals many very interesting facts in this connection.

The learned historiographer of Barbadoes, the Rev. Mr. Hughes, describes the disease scarlatina, and its

conveyance to human beings "both by contact with the diseased animals and by eating their flesh and drinking their milk."

In 1778 scarlet fever and epidemic angina in mankind were very prevalent in many countries, but particularly in England and Holland, and an epizootic among cattle, horses, asses, goats, pigs, etc., appeared.

In 1777 scarlet fever was epidemic in many countries, and in England and France was complicated with malignant sore throat and diphtheria. In March of that year angina gangrenosa developed among horses.

In 1514 Frusator described a pestilential exanthematic or eruptive fever among animals somewhat like the measles or purpuric fever in man, but more particularly resembling the scarlet fever of Sydenham, or the malignant miliary fever as described by Hamilton and Alloni, but more exactly by Waltherius. An eruption appeared on the face, ears, neck, and forelegs, attended with sore throat. It was a kind of quinsy, followed by eruption. In 1735 angina ulcusculosa, or scarlet fever, prevailed for the first time in America. In 1734 scarlet fever was epidemic in England and Scotland, and nephritic colic among horses. There was also an epizootic among horses in England and Scotland, which Hensinger thinks may have been scarlatina. In 1760, in the county of York, England, during February and March, scarlatina, sometimes complicated with malignant sore throat (diphtheria) was epidemic in the human species. At the same time an epizootic manifested itself among horses, which affected every animal in the locality with symptoms very similar to those observed in mankind. One hundred died in a week.

In 1768-69 an epizootic anthrax in animals was prevalent in Switzerland, coincidently with gangrenous sore throat; malignant pustule and epidemic diseases such as scarlet fever and angina were common in the human species.

In Copeland's "Encyclopedia of Medicine" we read: "I have lately had reasons, indeed evidence, for the following inferences: (1) That scarlatina was originally a disease of the horse, and that it formerly occurred, and has recently occurred epidemically, or as an epizootic among horses. (2) That it was communicated in comparatively modern times from horses to man; (3) that it may be, and has been, communicated also to dogs."

Mr. Percival, veterinary surgeon to the First Regiment of Life Guards, in his work says: "Like smallpox, scarlet fever was first generated in the lower ani-



mals . . . and was then communicated to man."

In a paper entitled "Consumption Caused by Cow's Milk," published in the *Medical and Surgical Reporter*, April 29, 1893, Dr. McQueston, the writer, says: "Consumption is the result of drinking cow's milk, and where milk is not used the disease is said not to occur. I mean exactly what I say," he continues, "no more, no less. The primary cause of consumption is the drinking of cow's milk. I do not mean that every single case of phthisis is attributable directly to the patient's having imbibed infected cow's milk—though even so strong a statement as that is very nearly true—but I do mean to say that if the American people stopped using cow's milk, and butter and cheese made from cow's milk, tuberculous consumption would soon disappear. Let me put it in another way: In countries where cow's milk is not used tuberculous consumption is not known. In China there is no milk consumed, and consumption is almost an unknown quantity. Take the steppes of Asiatic Russia: only goat's milk and mare's milk is used there. Consequently there is no consumption. . . . The same condition is, or was until recently, true of the South Sea Islanders—no cows, no tuberculous diseases. Take

the North American Indians before the white man brought his whiskey and his cows among them. They had no word in the Indian language that corresponded to consumption. A few cases may be produced by the person inhaling the dried sputa, and some may be inherited, but the great cause, and the first cause, is the use of cow's milk as a food."

The conclusions arrived at by Dr. McQueston in regard to consumption in its relation to cow's milk, from investigations made by him, are identical with those of the writer of this paper in regard to scarlet fever in its relation to cow's milk, arrived at after an entirely independent investigation.

If the facts cited above, and the suggestions thrown out shall result in a new line of investigation by medical men as to the etiology of scarlet fever, I shall feel fully repaid for the trouble I have taken in preparing this paper.

<sup>1</sup> Since the above was written the following paragraph in the *MEDICAL RECORD* of September 16, 1899, has come under my observation: "The *Journal of Tropical Medicine* says that the *Indian Medical Gazette* has since 1870, collected a considerable amount of information regarding the prevalence of scarlet fever in India. Up to that time it was believed that the disease was unknown in that country. Colonel Kenneth Macleod, writing to the *Journal of Tropical Medicine* on the matter, comes to these conclusions: (1) That scarlet fever has been frequently imported by troop ships and that small epidemics have thus arisen among Indian natives in children. (2) That these epidemics have always been of a limited kind and have speedily died out. (3) That they appear to be more substantial and protracted in hill stations than on the plains. (4) That cases and groups of cases have been observed, the origin of which could not be ascertained. (5) That the disease does not appear to prevail epidemically among indigenous races and populations."





















